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# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### Anæsthesia Apparatus

I, HERBERT HAMMERMANN, of Muellerstrasse 79a, Berlin N 65, Germany, of German Nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an apparatus for use in administering liquid anæsthetics, and particularly for administering those liquid anæsthetics which are dispensed in ampoules, such as trichlorethylene.

It is known that trichlorethylene is an approved anæsthetic, provided it is used in its very purest form. On the other hand it possesses the peculiar feature of easily becoming decomposed so that it has already been proposed to re-test trichlorethylene kept in large containers, for purity before use and also to draw off, under nitrogen, quantities small enough almost completely to be used up during a single treatment, so that the remaining surplus can be thrown away without excessive loss. It is an object of the invention to employ liquid containers which deliver automatically, regardless of the size of the container, only so much liquid as immediately will straightaway be used. The invention is founded on the knowledge that ampoules with pointed end, as long as this point is not completely broken off but only the extreme end removed, will only release the contents in minute quantities by violent shaking and are intended in general to be emptied by means of a syringe with a hollow needle. They empty themselves, however, spontaneously as soon as the open end pointing downwards is stood on a piece of blotting paper. That applies particularly to liquids which, like trichlorethylene, possess a low surface

tension and are heavier than water and this spontaneous emptying continues until the exuding liquid covers the open end of the ampoule and the supply of air necessary for emptying is cut off.

An apparatus for administering anæsthetics according to the present invention, is characterized by a liquid container with such a small opening that the contents thereof can only be slowly emptied by standing said opening on or in contact with an underlay.

Preferably an ampoule is used as a container for the liquid. According to the invention, therefore, the diameter of the pointed end of the ampoule must be so small, e.g. 3 mm. diameter, that by complete removal of the point the contents of the ampoule will only run out when the ampoule is placed on or in contact with an underlay with the opening pointing downwards. If the underlay is large the liquid will spread itself thereon without hindrance but if it is given the form of a comparatively small receptacle then the liquid coming from the ampoule very soon fills the small space and shuts off the opening of the container from the outer air so that no more liquid can escape because of shortage of incoming air. If further the underlay is provided with an absorbent sheet or pad this will become saturated and, according to the size of the sheet, evaporate the anæsthetic more or less rapidly. As the layer above the underlay is always kept constantly wet independently of the quantity of liquid remaining in the container the evaporation of the anæsthetic will always be the same, dependence only upon any regulation which may be provided in an apparatus for housing such containers. The absorbent layer is preferably renewed together with the ampoule and consists of

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tagiously only of a single piece of blotting paper. The ampoule can be placed with its point broken off or unopened in the housing. If it is preferred to insert the ampoule unopened in order to exclude even the small quantity of air in the housing from contact with the narcotic liquid before using the apparatus then it is recommended to crush the point of the ampoule from the outside by means of a screw having a tight fit in the bottom of the housing. The forward end of the screw may then be adapted to enter into a free space provided for the point of the ampoule in the bottom of the housing.

The drawing shows, by way of example, one anaesthesia apparatus constructed according to the invention. Fig. 1 shows this apparatus in side view, and Fig. 2 is a longitudinal cross section thereof whilst, Figs. 3 and 4 are sectional views, taken along the lines III—III and IV—IV respectively drawn to a larger scale, in which the parts of the mask visible under the same have been omitted. Fig. 1a shows an enlarged detail of the position of the crushing device according to Fig. 2 and Fig. 2a shows an enlarged detail of the position of the crushing device after the ampoule has been crushed. In Fig. 1, 1 is the outer tube of the apparatus which is covered by a cap 2 and at the lower end of which a mask 3 is fastened. The mask is provided with a rubber cushion 5 inflatable at 4, the lower part 6 of which is made comparatively small. A rubber band 8 is constantly held, by a clip 7 at each side of the mask and one band carries on its free end a clip slider of the usual type whereas the end of the other rubber band is drawn through the clip slider. Metal strips 9 on the rubber bands prevent the bands from being drawn through the clips. The bands may, however, for instance for the purpose of disinfection, be easily removed from the clips 7 by folding, laterally compressing, or longitudinally stretching part of the band 8 adjacent the clip so that it conforms somewhat to the configuration shown by dotted lines 38, and may be slipped through an aperture 39 of the clip 7.

Fig. 2 shows the body of the cock 10 soldered into the top of the outer tube 1 and closed at the top by a cock plug 11 and at its lower end by a tube 12 with bottom 13 and the screw 14 provided with a tommy bar. The cap 2 is firmly connected with the cock plug 11 so that the position of the cock passage can be altered by turning of the cap 2. The turning of the cock is limited by a short

piece of tube 15 (Fig. 1) and a recess 16 in the cap 2 which work together like a bayonet lock so that in the position as in Fig. 1 the cock 10, 11 is not only closed but at the same time is also held firmly in that closed position. By turning the cap in the direction of the arrow in Fig. 1 the cock can be opened and the plug of the cock and the cap may be removed. Soldered into the interior of the cock plug is an open tube 17. A flattened part 18 of the mask 3 has grooves 19 (Fig. 2) to which the lower end of the tube 1 is firmly soldered. The interior of the tube 1 is connected with the inside of the mask through a check valve 20. Likewise a connection exists between the inside of the mask and the outer air through a check valve 21. The plug 11 of the cock has rectangular apertures 22 and 23 as well as the aperture 24, all of which are connected to the interior of the tube 12 through a vertical channel 25. The body of the cock 10, in addition to the boring 26 (Fig. 3) which is connected to the tube 15, also has two borings 27 and 28 which are connected with the interior of the tube 1 through a vertical channel 29.

In the position of the cock plug 11 shown, the tube 12 and everything contained therein is shut off from the outer air. By turning the cap 2 in the direction of the arrow (Fig. 1) the aperture 23 (Fig. 3) is placed in coincidence with the boring 26, and the recess 22 with the boring 27, so that air from the tube 15 can travel through the boring 26 of the body of the cock, through the aperture 23 of the plug of the cock to aperture 22 and from there through boring 27 and channel 29 to the interior of the tube 1 and right through the check valve 20 to the mask 3. By further turning the cap 2 the gradually narrowing aperture 22 progressively closes the way for the air to the boring 27 and finally closes it entirely so that the air is forced from now on to take the way from tube 15 through boring 26 of the body of the cock through tube 17 and from there to pass upwards in the interior of tube 12 through channel 25, aperture 24 and boring 28 to the channel 29 and then through the outer tube 1 and the check valve 20 to the interior of the mask 3. Thus, depending upon the position of cap 2 the interior of tube 12 will be completely shut off from the outer air as the illustrations show or a short circuit conduit may be formed by turning the cap in the direction of the arrow, which, by by-passing the interior of tube 12 allows the air to flow directly from tube 15 to the inside of mask 3. Finally the

short circuit conduit is gradually interrupted and the air must, increasing with the turning of the cap in the direction of the arrow, pass more and more through the tubes 17 and 12 before it reaches the mask 3.

In Figs. 1a and 2 the ampoule is still in its untouched state. The point of the ampoule has perforated the blotting paper 30 in the region of the centre line of the pipe 12. By means of the tommy bar 114 the screw 14 is turned to the left as far as this is possible. The disc 41, which is pivotably fastened on the end of the screw 14, touches the left side of the recess 314 as shown in Fig. 2a. On moving to the right the disc 41 also presses the point 131 of the ampoule 31 to the right until it touches the right side of the receptacle 112. When sufficient pressure is applied to the point 131, it will burst (Fig. 2a). When the tip of the ampoule has been broken the recess 314 and the receptacle 112 are filled with narcotic liquid and it will overflow to the bottom 212 of the pipe 12 until the said liquid closes up the opening 231 of the ampoule. It is immaterial whether the opening of the ampoule is regular or has a zig-zag rim or whether a part of the rim projects into the receptacle 112 or is above the blotting paper 30.

In order to use the described apparatus as a narcotic apparatus a pair of strips of blotting paper 30 which may be perfumed, are pinned together crosswise and laid on the inner wall of tube 12. By the removal of the plug of the cock an ampoule 31 containing a small quantity of trichlorethylene purissimum and perfume is inserted in tube 17 with the point outwards, and the apparatus is reassembled. The screw 14 is now tightened, which action causes an end cap 41 of the screw to be pressed into contact with the point 40 so crushing the point and leaving an opening in the ampoule which lies substantially in contact with the blotting paper 30. The mask placed on the nose of the patient as indicated in Fig. 1 and finally the end of the rubber band projecting through the clip slider is tightened until the whole appliance lies tightly round the nose of the patient. The inhaled air will then, according to the setting of the cap 2 with the cock 10, 11 closed, flow only through the free opening 32 or, according to the turning of the cock 10, 11 in the direction of the arrow (Fig. 1) take the path, more or less in the manner described, through the apparatus and will enrich itself with fumes from the narcotic liquid in the blotting paper 30. With patients breathing very feebly the opening 32 may

already be admitting sufficient air, so that in spite of the apparatus being fully opened for gas, only fresh air is inhaled. One can easily determine this by the smell of the exhaled air. In this case the upper end 33 of the check valve 21 pivoted on 34 is turned towards tube 1 so that the free opening 32 is more or less covered and that breathing takes place mainly through the apparatus. On the outer tube there is also a rest 35 with a conical boring provided to take a conical plug 36 with a flat lever 37. This flat lever consists of a piece of sheet metal of semi-circular shape which, if not used may lay closely on tube 1, but which when in use stands more or less away from it. A pressure from above on the conical plug holds it tight in any desired position; a pressure from below will again free it. In the exceptional cases in which the rubber pad 5 does not satisfactorily seal the mask 3 on the face of the patient, or if the patient only reacts to very strong doses, the tube 15 can be attached by means of a hose to bellows which will convey to the patient varying quantities of narcotic liquid in the form of a vapour air mixture according to the speed with which the bellows is operated.

What I claim is:—

1. An apparatus for administering anæsthetics characterized by a liquid container with such a small opening that the contents thereof can only be slowly emptied by standing said opening on or in contact with an underlay.

2. An apparatus as claimed in claim 1, characterized by the use of an ampoule as the liquid container, the pointed end of said ampoule having so small an inside diameter that after removing the point, the contents of the ampoule can only be slowly emptied by standing its opening on or in contact with an underlay.

3. An apparatus as claimed in claim 1 characterized by an underlay forming a small receptacle.

4. An apparatus as claimed in claim 1 in which the opening of the ampoule rests on an absorbent material with sufficient surface to cause the anæsthetic to evaporate.

5. An apparatus as claimed in claim 4 in which the absorbent material is blotting paper.

6. An apparatus as claimed in claim 5 in which the blotting paper is perfumed.

7. An apparatus as claimed in any of claims 1 to 5 in which a cock is provided with passages, the position of which may be altered by turning the cock.

8. An apparatus as claimed in any of claims 1 to 6 with provision for attaching

a bellows to the container to force air through the apparatus.

- 5 9. An apparatus for administering anæsthetics which comprises a housing to enclose an ampoule, the tip of said ampoule being crushed from outside by an airtight screw provided in the bottom of the housing which can be screwed into a free space provided to receive the tip

of the ampoule.

10. An apparatus for administering anæsthetics substantially as herein described with reference to the accompanying drawings.

W. P. THOMPSON & CO.,

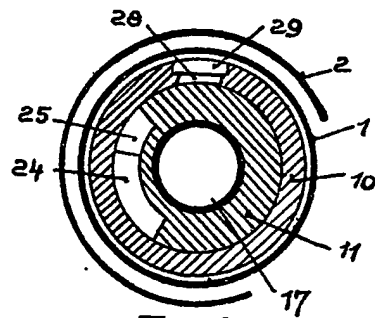
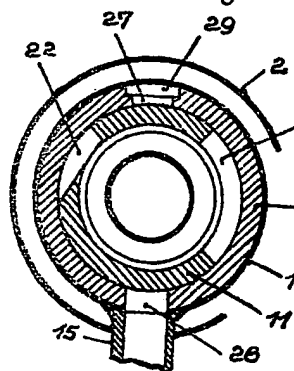
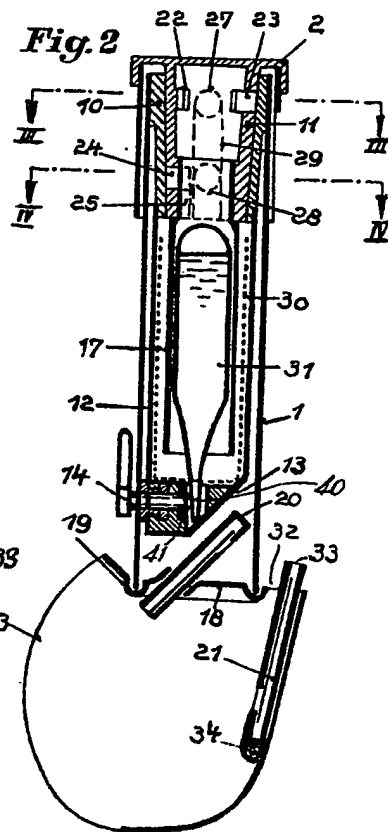
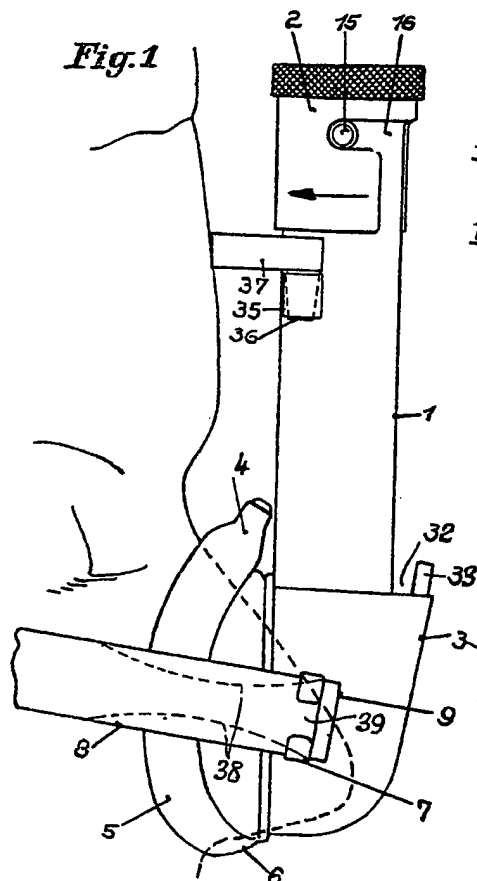
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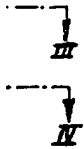


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SHEETS 1 & 2



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Fig. 1a

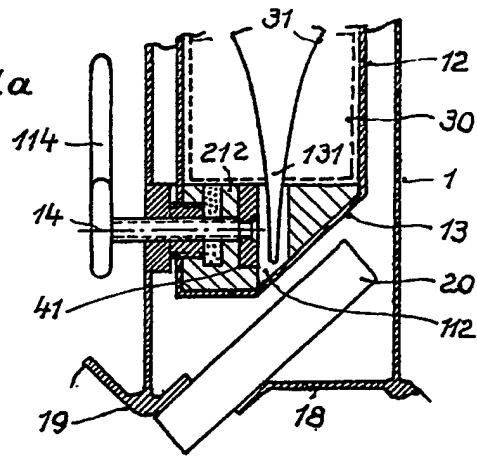
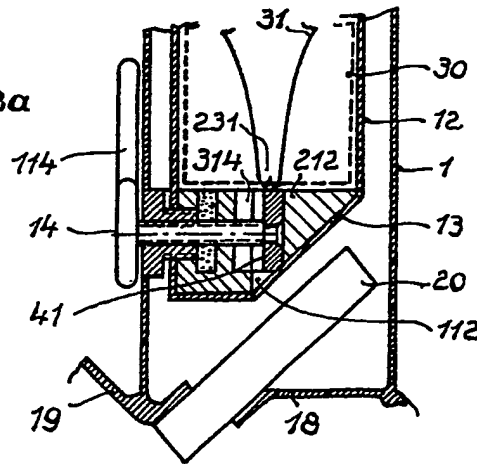


Fig. 2a



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